

An Application of the Multi-Mission Earth Entry Vehicle: Galahad

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ABSTRACT

In April of 2009, NASA released an Announcement of Opportunity to implement the 3rd mission within the New Frontiers Program. Sample return mission concepts were highly represented among the proposals submitted during the Step 1 down selection process. One of these proposals, Galahad, proposed to rendezvous with a binary asteroid, collect a sample from the surface, and return this sample to Earth. Galahad presents an opportunity for the In-Space Propulsion Technology (ISPT) Program to apply the Multi-Mission Earth Entry Vehicle (MMEEV) concept to an actual flight mission application, as well as to continue development and risk reduction of the unique MMEEV concept, leveraging this technology development effort into offering an eventual flight hardware development path.

This presentation will describe the utilization of the MMEEV concept for the Galahad EEV design. An overview of how the MMEEV concept is optimized for Galahad to meet all mission and payload accommodation requirements is provided. Engineering estimates of MMEEV vehicle and trajectory performance are generated using the NASA Langley Research Center's (LaRC) Program to Optimize Simulated Trajectories (POST2) 6-DOF simulation software. Preliminary estimates for heat rates, heat loads, impact environments, thermal soak, and other vehicle and trajectory performance characteristics are provided for the baseline Galahad mission. An overview of the Thermal Protection System material selection and sizing process is also discussed.

Finally, a description of where the Galahad EEV fits within the MMEEV trade space is presented. Since the New Frontiers Step 1 process occurred prior to recent developments in the MMEEV trade space modeling development, the Galahad EEV design will be used to validate, or benchmark, the current processes and tools being developed for MMEEV.